# Computer Building

South of Scotland Electricity Board

# Computer Building

The central computer operations of the South of Scotland Electricity Board are housed in a custom-designed building, opened in March 1981, at Board headquarters in Cathcart, some three miles from Glasgow city centre. The headquarters complex supports all central financial, commercial, engineering, personnel, administrative and management service functions.

The Board began to centralise their computing power in the early 1960s with the installation of ICT 1500 machines in Glasgow and Portobello. In 1969 an ICL system 4 computer was installed at Cathcart House. From then onwards, the workload steadily increased and by the mid-1970s it was clear that a larger and more sophisticated computer was essential. For economic and strategic reasons it was decided to have a separate building to house a new large central computer to meet the Board's needs for the foreseeable future.

Design and layout of the computer building was the responsibility of the Board's architect and involved close liaison with specialist consultants. The latest techniques of integrated environmental design were used, with lighting, temperature and heat-recovery air conditioning all controlled to provide a pre-determined environment. Construction began in April, 1978 and the building was brought into service in December, 1980.

More than 100 people are involved in computer operation, data control, data preparation and other ancillary functions.

Detailed work flow studies were undertaken to provide optimum working efficiency in the building. The basement floor contains the central computer installation. Surrounding this are rooms for microfilming, optical character reading and telecommunications equipment. Other rooms house job assembly and engineering support staff.

Power stations, area and district offices, and the Board's systems operations section are linked to the communications room within the computer building.

## Computing power

The central computer is a sophisticated ICL Dual 2972 computer complex with facilities to ensure the continuous availability of processing power. It is supported by a variety of fail-safe air conditioning and power supply plant.

The Dual 2972 configuration offers the advantages of fast computing, large on-line data storage capacity and greatly enhanced data processing power. The system has an exceptionally good level of reliability because maintenance can be carried out on one processor while the other continues to operate, and because some of the workload can be taken by the other processor in the event of a failure.

## Use of the computer

The central computer supports numerous large batch data processing systems which complement the Board's major financial, commercial and personnel functions, including consumer billing, stores management, payroll and general ledger applications. Considerable computer power is also required to support generating plant maintenance programmes in optimising the use of power stations and in controlling fuel purchase and consumption. A telecommunications service is used by all the Board's major power stations, the systems operations section and major engineering departments for a wide variety of load forecasting and plant scheduling calculations. The communications room within the computer building makes full use of modern techniques in telecomputing hardware, including line testing and fault locating equipment, again ensuring reliability and efficiency of the on-line service.

Initially some 50 terminals are attached to the central computer. The Board envisage much more extensive use of terminals in the years ahead.

## Architecture

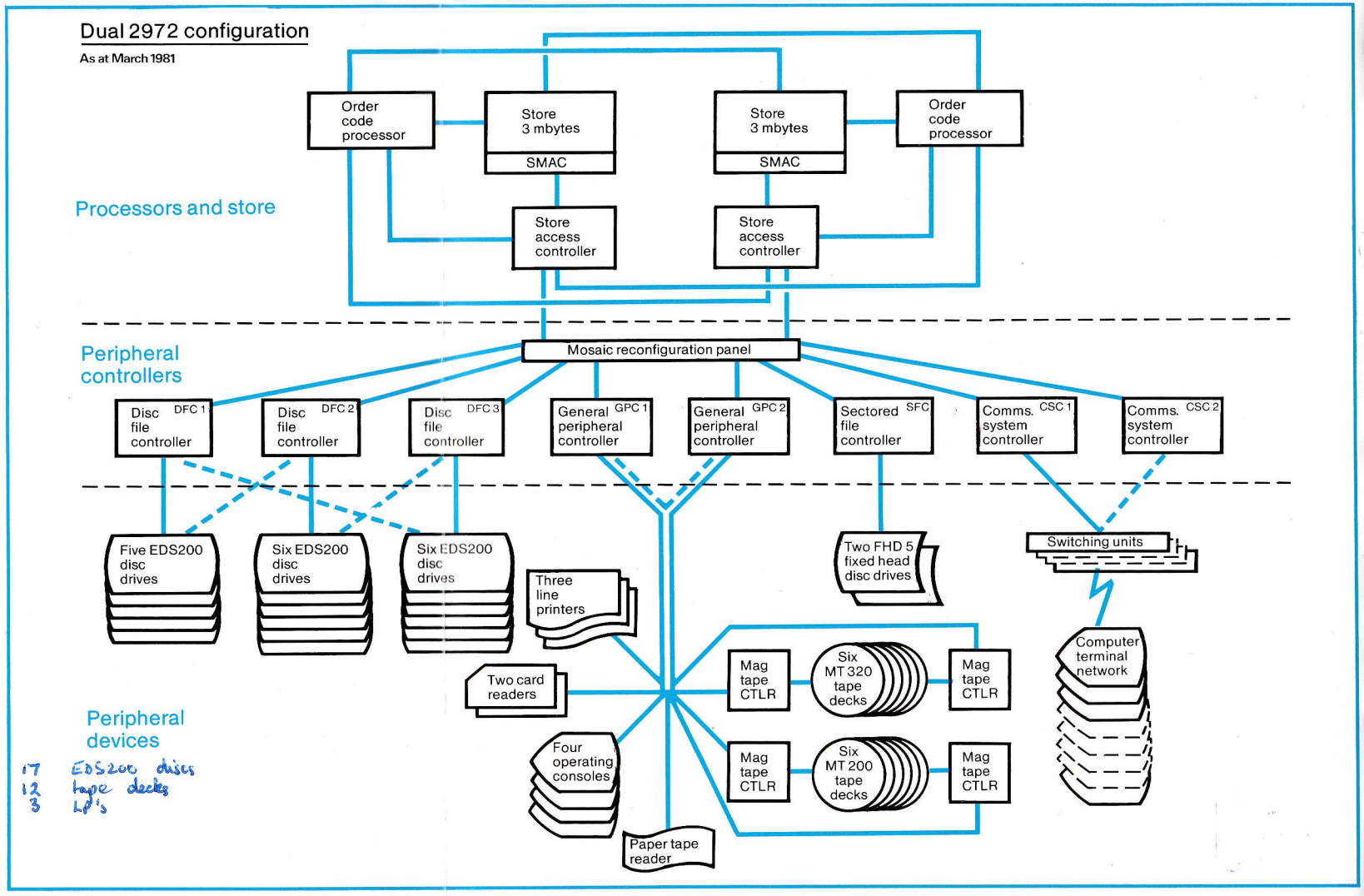
The headquarters site area is about 12 acres of open land partly enclosed by a meander of the River Cart. Development of earlier Board buildings included tree planting which, together with landscaping, provides a pleasant setting. It was decided from the outset to retain as many existing mature trees as possible to preserve the environment.

The computer building is next to the two main office buildings, on a rectangular piece of land. To minimise visual impact the building was designed as a two-storey structure with one floor underground.

The ground-level floor houses data control, data preparation and data despatch staff, the latter two sections being conveniently close to automatic document hoists. A large stationery store, near a loading bay, is also on the ground-level floor.

A tunnel links the new building to the main entrance foyer and the two office blocks. There is extensive plant room accommodation in the basement and a roof plant room with enclosures around cooling towers. External doors in the building provide emergency exits.

The 55 metres by 35 metres building has a reinforced concrete frame, concrete waffle structural floors and concrete roof finished in asphalt. Externally the building is clad in facing brickwork surmounted by textured, glass reinforced plastic panels around double glazed windows. The internal finishes minimise maintenance. The computer hall is lined



with vinyl-faced removable panels. The main functional areas are very open and have suspended floors to provide flexibility of services for organisational changes. The floor tiles are covered by an anti-static carpet and the ceilings consist of perforated metal with acoustic pads.

## Air conditioning

The entire building is air conditioned, with dissipated heat recovered in an integrated environmental design system. The computer building is self-sufficient in terms of heating and provides heating for the main office buildings at Cathcart. The air conditioning systems have central refrigeration plant, comprising three helical screw chillers each with a maximum capacity of 475 kilowatts. The chillers operate in conjunction with four closed circuit cooling towers housed within a weathered enclosure adjacent to the roof.

Control of the computer suite temperature and humidity—21 degrees centigrade at 50 per cent relative humidity—is by means of eight recirculating air handling units in the basement plant room. They provide air filtration, cooling, humidification and reheat facilities within the 12 controlled zones of the suite. Fresh air is introduced from roof level by two smaller air handling units.

The duty air handling units, any six of the eight, are designed to recirculate in total approximately 22 cubic metres a second, which represents around 30 air changes an hour. Conditioned air is introduced into the computer suite through perforated floor tiles to offset heat gains of up to 230 kilowatts mainly from computer equipment, personnel and lighting. The air goes back to the plant through perforated ceiling tiles.

Ancillary areas and the paper store are air conditioned by means of three dual zone air handling units serving the six zones on the ground floor of the computer building. These units are similar to those serving the computer suite but do not incorporate the additional air filtration stages. Conditioned air is introduced into the data preparation suite in the upper floor through ductwork and perforated ceiling tiles. The air is recirculated or extracted by means of ceiling-mounted ducts.

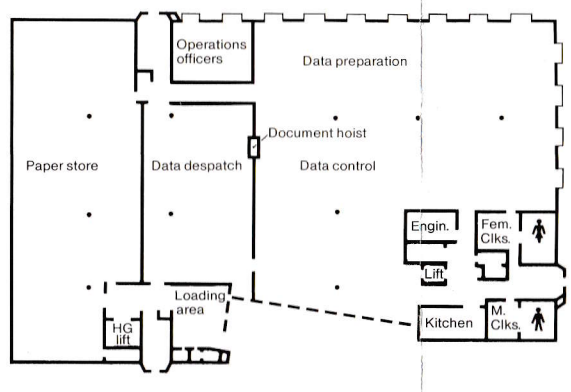
The motor alternator and refrigeration plant rooms are themselves provided with ventilation and cooling to maintain a reasonable environment for the operation and maintenance of the equipment. Under full load operation this area could be subjected to a heat dissipation of 120 kilowatts.

## Lighting

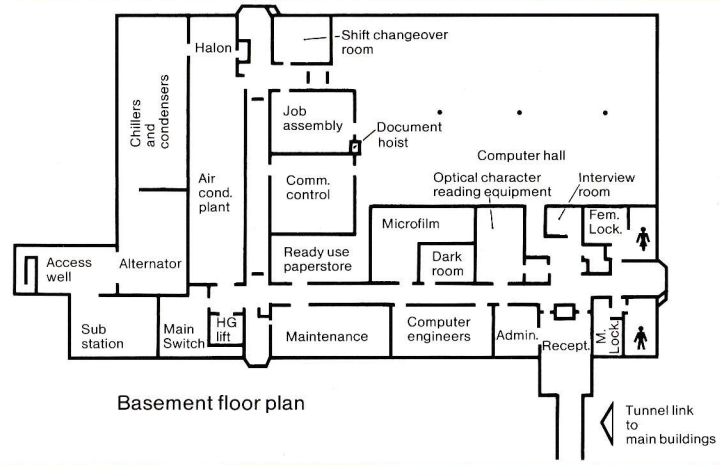
Lighting and general power throughout the building are served from the main switchboard via fuse

### Main computer applications

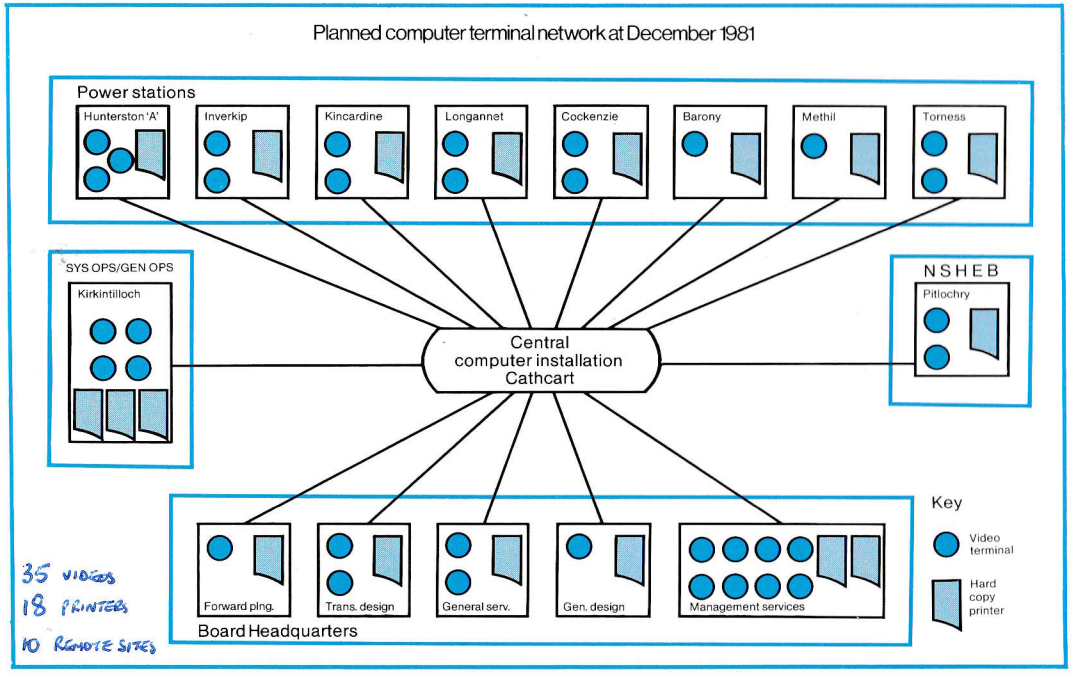
- Consumer billing
- Order of merit
- Payroll
- Power systems analysis
- Stock control
- Strategic generation planning
- Invoice payments
- Maintenance job card production
- Cost and financial ledger
- Project network analysis and control using PERT

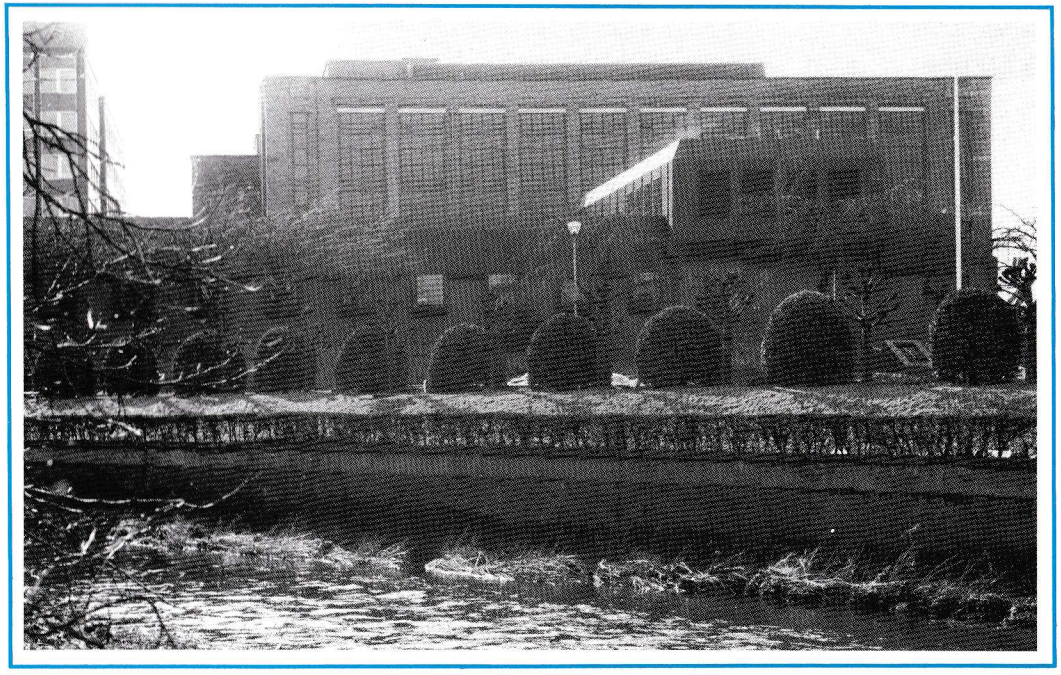



Ground floor plan




Basement floor plan



distribution boards around the building. The lighting generally is by means of recessed modular fluorescent fittings with an average light level of 600 lux. These fittings are completely recessed, having low-glare prismatic diffusers. One, two or three lamps per fitting can be lit at any one time, affording a certain amount of flexibility in lighting levels in the computer room.

Emergency lighting throughout the building is by 110-volt tungsten fittings in all corridors, stairs and work areas. This lighting is served from a central battery unit in the main switchroom, with sensing relays in each main fuse distribution board to detect local power failures.

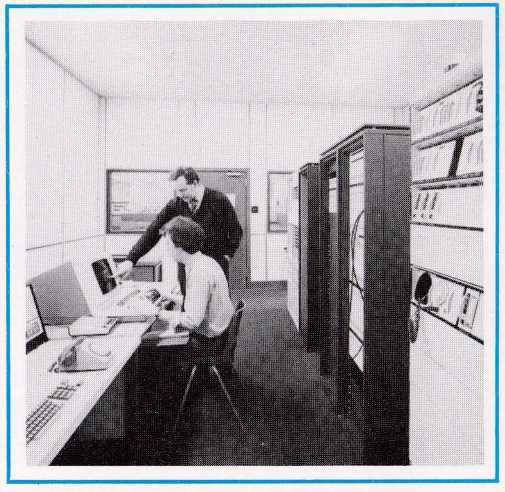
## Fire protection

The building is protected by a network of heat and smoke detectors connected to a central monitoring panel, and audible alarms installed throughout the building. Flashing alarms are also provided in plant areas which have high noise levels.

Signals from sensor heads are relayed back to a continually manned central monitoring panel which initiates the course of action to be taken. In turn the information goes to a centralised monitoring computer for use by security personnel.

In particularly vulnerable areas a fire control system augments the normal fire alarm system. The paper store is protected by water sprinklers but the pipework is not charged with water until a smoke detector is activated. When the heat detector in the sprinkler head reaches a certain temperature water is discharged into the area, thus reducing the risk of water damage because of a false alarm.

The computer suite and ancillary rooms are covered by a Halon 1301 inert gas extinguishing system. This comprises a central bank of cylinders in the basement plant room with zone control valves, and pipework distribution to ceiling and underfloor mounted gas discharge outlets in the protected areas. Control of this system is automatic or manual. To reduce the risk of accidental discharge as a result of a false alarm, two smoke detectors have to operate before activating the system.



## Electrical services

The building is served from two transformers (1 MVA 11 kv/415 volt), either of which can take the total load. In the event of mains failure affecting one, the load is automatically switched to ensure continuity of supply.

Power is fed to the computer suite by three 150 KVA, 50 hertz motor alternator sets for main power distribution and three 25 KVA, 400 hertz sets for computer processors. Flywheels have been fitted to all six units, ensuring continuity of power to the computer even in the event of a complete break in supply of up to 100 milliseconds. This system can cater more than adequately for automatic transformer changeover. All three 150 KVA sets feed to a common busbar, to ensure supply.

The three 25 KVA motor alternator sets do not run in parallel. One is retained as a standby in the event of failure of the others.

All power sockets in the computer room, and throughout the building, are installed in flush floor outlet boxes, wired through underfloor services ducting.

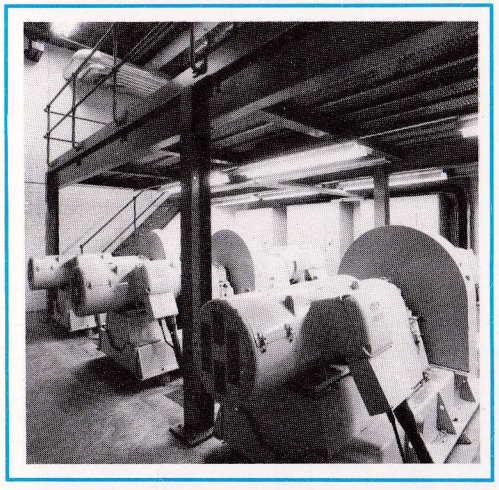
In the event of an emergency, "Power-off" buttons strategically placed in the computer room trip a contactor and shut down all equipment within the computer hall.

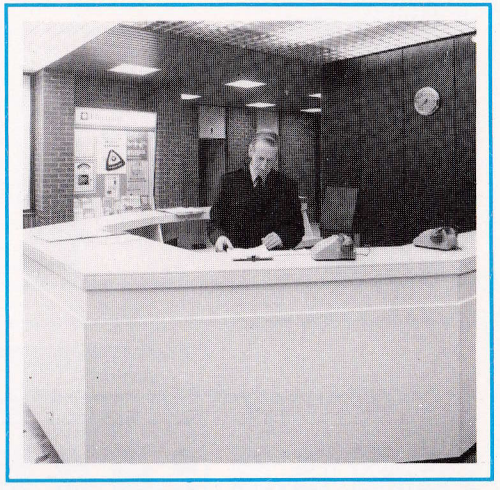
The main control consoles are located in the plant room, with all electrical and mechanical functions displayed so that the state of operations can be seen at a glance.

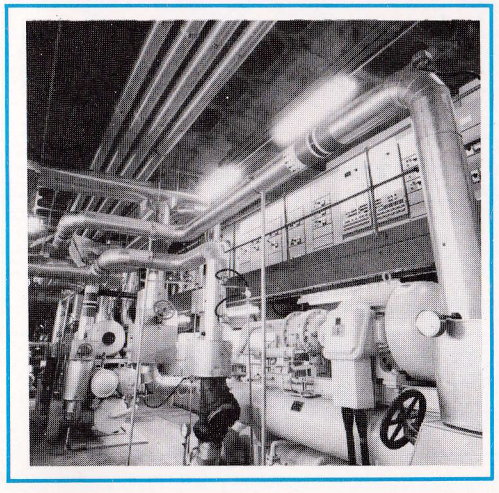
Certain significant conditions are relayed to the central monitoring panel so that, as in the case of the fire detection system, security personnel can take appropriate action.

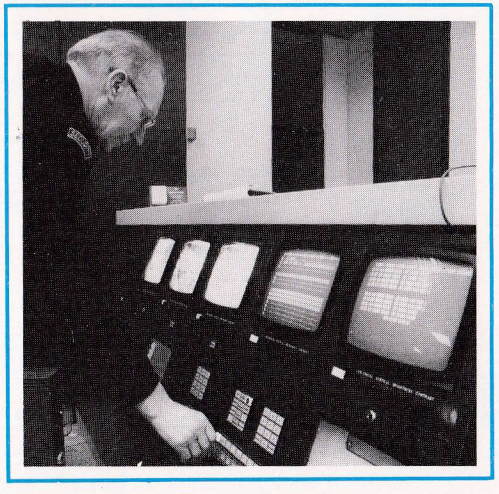
## Security

A card/key access control system restricts and monitors access to the new computer building. Inside there are various levels of security, plus closed-circuit television cameras.









# MAIN CONSULTANTS AND CONTRACTORS

## DESIGN TEAM

Architect and Quantity Surveyor SSEB, General Services Branch

Mechanical and Electrical Services Hulley and Kirkwood, Consulting Engineers.

Structural Engineers Beattie, Watkinson and Partners, Consulting Civil and Structural Engineers.

## MAIN CONTRACTOR

Holland, Hannen and Cubitts (Scotland) Ltd.

## NOMINATED SUB-CONTRACTORS

Mechanical and Electrical Services Balfour Kilpatrick Ltd.

External Cladding Panels Aberglen Glassfibre

Lift Installations Otis Elevator Co.

Internal Partitions Cubitt/Neslo

Suspended Ceilings Martin Acoustics Ltd.

## SUPPLIERS OF COMPUTERS*

Central Computer International Computers Ltd

Microfilming Datagraphix Ltd.

Data Preparation General Computer Systems (UK) Ltd.

Optical Character Reading Scan Optics Inc.

Graph Plotter Versatec Ltd.

*As at 31 March 1981

MCS/JT/PR5625/2.5M/3.81